ANNUAL NARRATIVE REPORT
Calendar Year 1998

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

K. FEEDBACK

D. PLANNING

5. Research and Investigations

The Joppa Flats Bird Banding Station was established on the refuge in 1998. A SUP was issued to Massachusetts Audubon to maintain and operate two mist nest sites during spring and fall migratrions. A total of 176 birds of 30 species were banded during a ten day period between 4 April and 29 may. An additional 772 birds of 49 species were banded in the fall, 31 August tto October 23. An additional 59 recaptures of 15 speceis were recorded result9ing in 831 bird captures. Eighty one percent of the birds were HY, 11% AHY, and 8% were of unknown age. A total of 948 birds were banded at the two mist net stations in 1998.

E. ADMINISTRATION

8. Other Items

Refuge Biologist Deborah Melvin completed a one month detail in western Canada working with the Office of Migratory Bird Management. Melvin served as the crew leader for waterfowl banding activities at Wynyard and Melfort, Saskatchewan banding stations. She and her crew of four other service biologists banded a record of 10,163 ducks. A total of 12 species were banded including; 6,517 blue-winged teal, 2,799 mallards, 339 redheads, 260 green-winged teal, and 189 northern pintails. An additional 59 ducks including wigeon, black ducks, bufflehead, canvasback, lesser scaup, gadwall and one mallard/black duck hybrid were banded.

F. HABITAT MANAGEMENT

1. General

Nothing to report

2. Wetlands

On September 1, portions of three freshwater impoundments were treated with an aerial application of Rodeo to control *Phragmites.* See section F 10.

Marsh and water management differed for the three freshwater impondments. See the following highlights:

North Pool - This 100-acre impoundment is used by waterfowl, shorebirds, marsh and wading birds, and a diversity of other wildlife species. The vegetation is primarily composed of purple

loosestrife, narrow-leaf cattail, and Phragmites. Open water areas compose approximately 20% of the overall impoundment. The majority of open water is created by the main borrow ditch along the western edge (dike) runs north to south for about 6,400 feet with an average width of 87' and average depth of depth of 5'. This equates to approximately 2,839,680 cubic feet of water (105,173 cubic yards). The borrow ditch is basically used for loafing, water depths average about 3-4 feet in the north to 7-8 feet deep in the south section of the ditch. In addition to the borrow ditch a system of channels and small ditches exist in this pool which were widened and deepened with a Cookie Cutter in 1990 and again in 1994. Many of these have since silted in. The pool has a water control structure (WCS) which was installed in 1988 and later equipped with screw gate (1996). The WCS has a direct outlet to the saltwater estuary (Broad Sound waterway). Due to the inability to reflood at desired time periods due to a lack of a fresh water source other than relying strictly on natural precipitation, the Refuge has been unable to effectively manage this impoundment for waterfowl and shorebirds. Various management activities have taken place over the years and have included mowing, brackish water management, burning, releasing bio-control agents (see Section F.10) and to a limited degree freshwater level manipulations.

The primary objectives for the management of the North Pool in 1998 were to:

1. Maintain habitat quality for the propogation and dispersal of bio-control agents (leaf-eating beetles (*Galeracella*) and root-mining weevils (*Hylobius*) at the northern (40%) of the pool.

2. Control *Phragmites* in the southern 60% of the pool to open up areas and promote the germination of native speceis and increase habitat diversity.

3. Conduct a study to determine the "water holding" capacity of the pool in order to better understand the hydrological factors involved in filling in portions of the burrow ditch and over-flooding higher areas of the impoundment which are dominated by Phragmites, cattail and loosestrife.

In 1998, objectives decsribed in 1 and 2 were primarily accomplished. However, staffing constraints (time and money) hindered our ability to completed

Bill Forward Pool - This 62-acre impoundment is separated from the North Pool by a small dike containing a water control structure which

allows the transfer of water between the two pools to the point of equilibrium and a second inoperable water control structure on the western dike to the Broad Sound water system. The Bill Forward Pool is much shallower than North Pool and more heavily used by shorebirds and wading birds, in addition to waterfowl and other wetland species. The pool does not retain water adequately, but migrating shorebirds take advantage of exposed mud flats from declining water levels in the summer. In contrast to North Pool, Bill Forward Pool lacks the system of smaller channels and ditches off its main waterway. Approximately 50% of the pool is open water. Vegetation in the Bill Forward Pool is primarily composed of cattail, *Phragmites*, purple loosestrife, with smaller percentages of tickseed sunflower, dwarf spikerush, flat sedges and various grass species intermixed with seasonal composites.

The primary objective is to provide roosting and foraging habitat for spring waterfowl migration and fall shorebird migration.

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Future management options include continuation of pest plant control to encourage vegetative diversity, replacement of the current inoperable water control structure to increase drawdown capabilities, and possibly installing a pump on the cross dike which can be utilized for water level management activities in either the Bill Forward Pool and/or the North Pool.

Stage Island Pool - This 100-acre impoundment has a large amount of water/vegetative interspersion with several islands and peninsulas in both shallow and deep water. This pool consists primarily of cattails with expanding patches of *Phragmites*. However, the gradual spring/summer drawdown this year exposed previously flooded mud flats which promoted germination of dense stands of dwarf spike rush intermixed with flat sedges, American and Onley three-square, millet, goosefoot and sporatic stands of bulrushes. Lush stands of panic grass dominated the drier areas. Unfortunately, the lack of available precipitation in early fall hindered our ability to put water over these areas and most of the spikerush dried out. Late fall precipiutation did eventually flood these flats and thousands of ducks and geese were observed foraging in this impoundment. This pool has been identified as having the greatest potential for moist-soil management capabilities,therefore, future management actions will be directed at periodic flooding and varying drawdown cycles. Aggreesive efforts will continue to control phragmites and purplke loosestrife (see Section F.10)

Salt Marsh - The salt marsh portion of the Refuge consists of approximately 3,000 acres of *Spartina* grasses interspersed with creeks, mudflats, and pannes. The marsh was extensively ditched in the past to control mosquito populations and/or drain for salt marsh hay production. Several of the ditches have filled in naturally, restoring some of the former salt pannes, particularly at the Salt Pannes Wildlife Observation area between boardwalks #2 and #3. The marsh is part of the largest salt marsh system north of Long Island Sound. It is a valuable spawning and nursing area for many of the major marine food sources. Eight of the twelve fish species most important to local commercial and sport fisheries are dependent upon these tidal areas. A diversity of shorebirds, wading birds, waterfowl, and other wildlife species are also dependent upon these tidal wetlands. Management of the salt marsh is primarily through protection, restoration, and enhancement of the ecosystem for a diverse assemblage of avian species and other organisms in the biological community.

Beginning in 1991, the refuge and Northeast Massachusetts Mosquito Control and Wetlands Management District (fna Essex County Mosquito Control Project) intiated a cooperative agreement to conduct Open-Marsh Water Management (OMWM) on the salt marsh for mosquito control and salt marsh restoration. Each subsequent year has resulted in increments of marsh, ranging from two to seven acres, undergoing OMWM with the goal of restoring a large portion of the salt marsh to a more natural condition. This year, the sixth consecutive project was completed from mid April to mid May, totaling 4,927 cubic feet of salt marsh of OMWM/restoration alterations. To date approximately 25 acres have been restored using this technique.

5. Grasslands

6. Other Habitats

8. Haying

9. Fire Management

10. Pest Control

On July 17, Parker River, Rachel Carson and Great Bay National Wildlife Refuges received a joint shipment of 30,000 *Galeracella* beetles free of charge from Bernd Blossey, Cornell University in Ithaca, New York. These leaf-eating beetles are part of the bio-control program to control the invasive purple loosestrife plant found on each of these New England Refuges. Rachel Carson and Great Bay each received 2,000 with the remaining 26,000 going to Parker

River. Of these 26,000 beetles 18, 000 were released in the North Pool and the remaining 8,000 beetles were released at two sites along the northern edge within the Stage Island impoundment. This is the second release of the *Galeracella* beetles in the North Pool, 10,000 were released within the same site in the summer of 1996. Preliminary monitoring from last years release revealed that the beetles overwintered successfully. Several adult *Galeracella* beetles were counted within the one-meter square measuring plots and leaf damage noted on several plants. In addition, approximately 1,000 weevil eggs were directly implanted into the stems of some 400-500 purple loosestrife plants in 1996 at this same site. The success of the Hylobious weevils will require more time to document due to the fact that they are root feeders, not leaf eaters and control will be noted when plants become weakened and growth and vigor are lessened.

On June 2 and 3, Biologist Melvin attended a Purple Loosestrife Biological Control Field Monitoring and Rearing Workshop at Cornell University in Ithaca, hosted by Dr. Bernd Blossey. The workshop taught field biologists and resource managers how to monitor biocontrol insects (*Galeracella* and *Hylobious)* and vegetation in the field.

11. Water Rights

12. Wilderness and Special Areas

G. WILDLIFE

1. Wildlife Diversity

1996:

Refuge species diversity remained similar as in past years with a wide variety of avifauna. A total of 116 different bird species were observed during the standarized refuge surveys and included 21 species of waterfowl, 12 marsh and waterbirds,23 shorebirds,7 gulls and terns, 10 raptors and 43 passerines (observed during the breeding bird point count). In addition, another 10 incidental bird sightings were observed by refuge staff, volunteers and/or experienced birders. These incidentals included one golden eagle (Feb), northern shrike (Feb), a flock of turkeys (Apr), northern parulas (May), laughing gulls(Aug), turkey vultures (Sep), northern shoveler (Oct), common moorhen (Oct),and one black tern tern was reported by refuge visitors (Aug). This brings the refuge total to 126 bird species.

No standardized surveys were conducted on invertebrates, reptiles or amphibians. A mammal study was completed to update the refuge species list and to determine cost effective methods which can be used to monitor predators identified as potential threats to ground-nesting birds, especially threatened and endangered species. (See Section D.5)

2. Endangered and/or Threatened Species OK

The 1997 Midwinter Bald Eagle Survey for Parker River National Wildlife Refuge and the surrounding areas along the mouth of the Merrimack River in Newburyport, Massachusetts was completed on January 9 instead of January 10 due to staff schedules. No eagles were observed along the survey route.

The 1997 plover breeding season at Parker River National Wildlife Refuge was similar to last years nesting season and both proved to be difficult years for birds with fewer pairs successfully nesting and fledging young than in previous years. The maximum pair count was 17; however, only 16 pairs exhibited breeding activity and remained on the Refuge to nest. Overall, the 16 pairs produced 23 nest attempts, hatched 36 chicks, and fledged 20 young. The resultant productivity was 1.2 chicks per breeding pair, equal to last year's productivity but below the 1995 productivity of 2.1 chicks per breeding pair.

Eight of the 16 pairs were not successful primarily due to washed over nests, abandonment and suspected predation of fledglings. Three of the unsuccessful pairs hatched > two eggs but no chicks survived to fledge. The remaining five unsuccessful pairs did not hatch any eggs. A number of factors may have contributed to the failure to successfully nest on the Refuge, including: weather conditions and loss of beach habitat; disturbance and predation from fox, skunk, and unleashed pets; and possibly a "young", inexperienced population from increased recruitment.

Protection efforts continued to focus on monitoring birds, complete beach closure, use of predator exclosures, and plover wardens. Predator control methods were limited this season due to the ban on leg-hold traps used primarily for capturing fox. However, live traps were used near nesting territories which showed significant predator signs (tracks/scat). These traps successfully removed several problem animals from the nesting territory.

The implementation of a complete beach closure beginning in 1991 still appears to be the leading factor in increasing the number of

pairs present on the Refuge. The beach closure allows plovers to select their territories, incubate, and raise their young undisturbed, thereby increasing their potential for breeding successfully. A complete beach closure went into effect on April 1 closing the entire Refuge beach (6.4 miles) to all public entry. On July 1, a partial reopening of the southernmost section of the beach was implemented by opening the beach from Lot # 6 to Lot # 7. No nests or pairs had been observed along this narrow section of beach for several weeks. Another partial reopening occurred on August 6 when Lot #1 to Lot # 2 and Lot #5 to Lot #6 were opened due to the lack of use of these areas by the remaining piping plovers. The entire beach was reopened on August 13 after it was determined that all chicks had fledged. The remainder of the Refuge including the road, wildlife observation areas, nature trails (excluding the dune loop), and observation platforms remained open throughout the entire plover breeding season.

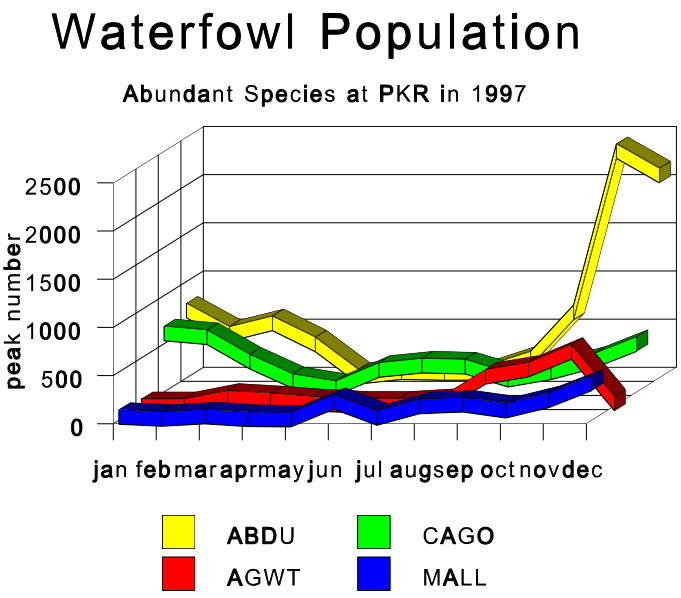
3. **Waterfowl**

Waterfowl surveys were completed by refuge volunteers (Bill & Phyllis Drew & company) during the year. A total of XX species were observed in 1997, a In/De crease from xx species recorded in 1996. Surveys were generally conducted twice a month. During the migration periods, survey frequency increased to weekly in an effort to increase survey results.

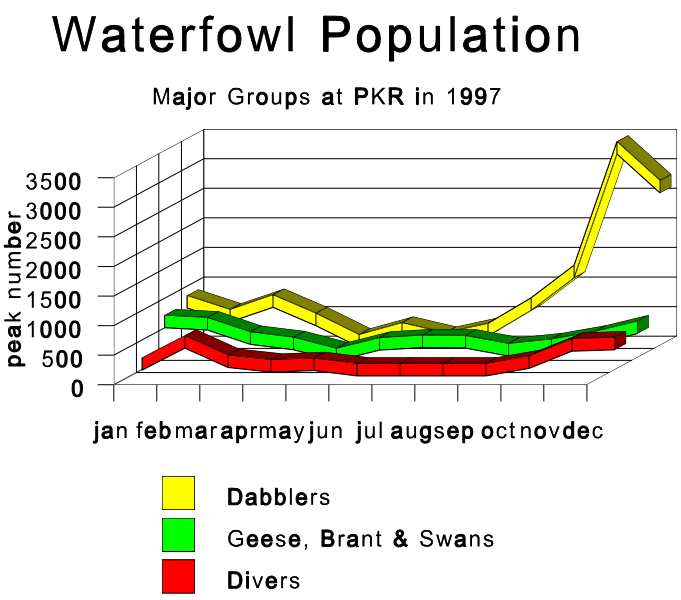
Peak Monthly Waterfowl Populations-Parker River NWR - CY 1997

Species	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	**TOTAL**
NOPI	2	27	31	1					4	82	120	25	**292**
AMWI			17	2							76	17	**112**
NSHO				3						3	2		**8**
AGWT			87	62	27	6	6	31	305	380	565	26	**1495**
BWTE				4	4	4	6	14	15	1			**48**
MALL	36	15	40	12	8	192	24	145	162	101	209	385	**1329**
ABDU	700	457	567	347	12	61	52	54	200	680	2355	2100	**7585**
GADW		3	7	8	26	16	20	21	13	3	14	128	**259**
RNDU										12			**12**
LESC			5									1	**6**
GRSC											1		**1**
BRAN		4		96	6								**106**

CAGO	610	570	315	112	40	230	275	265	130	205	325	500	**3577**
BUFF	11	27	24	15	2					15	42	47	**183**
COGO	6	22	12	10							10	35	**95**
SGWH				11		1				1	7	7	**27**
OLDS		10	2							30	35	14	**91**
MUSW	1	2	14	18	5			1	1	1	3	4	**50**
HOME		6	10							7	9	10	**42**
WWSC	66	36	4							27	145	40	**318**
COME			9	7									**16**
RBME	1	3	7	32	6	1				5		6	**61**
RUDU										4	2		**6**
COEI	15	365	70		85					27	175	290	**1027**
TOTAL	**1448**	**1547**	**1221**	**740**	**221**	**511**	**384**	**531**	**830**	**1584**	**4095**	**3635**	**16747**
1996:	**481**	**315**	**1222**	**990**	**182**	**294**	**354**	**845**	**1164**	**2466**	**826**	**1397**	**10536**



The chart on the left depicts waterfowl peak populations of the most abundant waterfowl species observed from volunteer surveys in 1997. As observed in this illustration black ducks peak during both the spring and fall migration and are the most plentiful waterfowl species during the winter months.



The chart on the left illustrates peak waterfowl populations during 1997 and is arranged by major waterfowl groups (dabbler or puddle ducks; geese, swans and brant; and diving ducks). This representation reflects the chronological use of various groups of waterfowl which occur on the refuge

4. Marsh and Water Birds

Marsh and waterbirds utilzed refuge pools and salt marsh pannes throughout the spring, summer and into early fall. Typical summer residents included great and snowy egrets, glossy ibis, and herons (great blue, green-backed, little blue, tri-colored and blacked crowned night herons). Snowy egrets were the most abundant species during the summer with a peak of 135 recorded in August, followed by a peak of 58 great egrets in August, and 79 great blue herons in April. Noteworthy observations included a least bittern in Stage Island in June and September, a couple of American bitterns, two sora rails in July and a common moorhen in October. A Virginia rail was heard during the landbird survey.

5. Shorebirds, Gulls, Terns and Allied Species

The Refuge provides an important stopover for a diversity of shorebird species, particularly during the late summer/early fall migration. These birds forage on the refuge beach front, in the salt marsh pannes and along the mudflats/edges of the impoundments that were drawndown earlier in the year.

6. Raptors

Volunteer Survey Data - Deb

7. Other Migratory Birds

One complete landbird survey (point count) was conducted on June 17 and 18, for the fourth consecutive year. Data is colllected from 34 fixed points along a standardized route and birds observations are recorded during a 3, 2 and 5 minute interval for a total of 10 minutes at each point. Individual birds heard and/or seen are recorded within and outside a 50 meter diameter. Peter Hunt was contracted ($128) to conduct the vocalization survey. A portion of the cost for this contract was covered by NBS/Patuxent. A total of 35 species were observed in 1997 compared to 44 in 1996,61 in 1995 (2 surveys completed) and 77 species in 1994 (3 surveys). The following table summarizes this years breeding bird point count survey data and calculates relative abundance and frequency of occurance.

PARKER RIVER NWR
Point Count Species Abundance and Frequency

Census Group: Landbirds Census Date: 06/17/97 To 06/18/97
Route Name : Parker River NWR Road Report Date: 07/23/97
Total Points Along Route: 34

Count Period: 10 Minute Count Summary Count Radius: Both Count Radius

Species	Total Observed	Relative Abundance	# Points Observed	Frequency
Yellow Warbler	66	11.50 %	29	100.00 %
Gray Catbird	58	10.10 %	28	96.55 %
Red-winged Blackbird	44	7.67 %	21	72.41 %
Common Grackle	32	5.57 %	17	58.62 %
Cedar Waxwing	31	5.40 %	14	48.28 %
Song Sparrow	31	5.40 %	22	75.86 %
Rufous-sided Towhee	27	4.70 %	22	75.86 %
American Robin	26	4.53 %	17	58.62 %
American Redstart	24	4.18 %	17	58.62 %
Mourning Dove	22	3.83 %	13	44.83 %
European Starling	20	3.48 %	11	37.93 %
House Finch	20	3.48 %	11	37.93 %
American Goldfinch	17	2.96 %	13	44.83 %
Northern Cardinal	17	2.96 %	5	17.24 %
American Crow	16	2.79 %	14	48.28 %
Yellow-throated Warbler	15	2.61 %	9	31.03 %
Purple Martin	15	2.61 %	9	31.03 %
Common Yellowthroat	14	2.44 %	10	34.48 %
Brown-headed Cowbird	14	2.44 %	11	37.93 %
Eastern Kingbird	14	2.44 %	10	34.48 %
Brown Thrasher	11	1.92 %	6	20.69 %
Willow Flycatcher	8	1.39 %	8	27.59 %
Bobolink	7	1.22 %	5	17.24 %
Field Sparrow	6	1.05 %	5	17.24 %
Tree Swallow	4	0.70 %	3	10.34 %
House Sparrow	3	0.52 %	3	10.34 %
Downy Woodpecker	2	0.35 %	1	3.45 %
Chimney Swift	2	0.35 %	1	3.45 %
Savannah Sparrow	2	0.35 %	2	6.90 %
Marsh Wren	1	0.17 %	1	3.45 %
Rose-breasted Grosbeak	1	0.17 %	1	3.45 %
Northern Oriole	1	0.17 %	1	3.45 %
Northern Mockingbird	1	0.17 %	1	3.45 %
Black-capped Chickadee	1	0.17 %	1	3.45 %
Great Crested Flycatcher	1	0.17 %	1	3.45 %
Total Observed For Route	574		29	

# Points Observed = Number of Points Species Was Observed.
Frequency = Number Points Species Observed / Number Points Surveyed.

On April 11, 1997 Refuge Biologist Deb Melvin and Volunteers Bill Drew, Wally Dash, Carl Reidl, Doug Chickering and Dana Jewell erected the Purple Martin boxes on the Parker River National Wildlife Refuge. The crew began at 1:00pm and finished around 4:00pm. All boxes were installed except Box # 9 which used to be at Stage Island. Since this box has not produced any purple martin nests for the past couple of years it was decided not to put it back up. In addition, the two telescoping aluminum boxes donated to the Refuge last year (1996) were erected at Lot # 1 and 3. This will actually be the first year these boxes will be available to the purple martins because last year the boxes were put out late (5/24/96). A new house was also installed at Hellcat Swamp Parking Lot #4. This new house was put together by Maintenance Worker Bob Springfield and is considered the newest technology in purple martin boxes. The four box house is constructed of pine and cranks up and down a 6x6 pressure treated pole. The telescoping ability greatly enhances cleaning out unwanted species and enhances overall maintenance of the compartments. The openings to each compartment are elliptical in shape like a half moon which reportedly discourages use buy non-target species such as house sparrows and starlings.

On October 16, Refuge Biologist Deb Melvin, Maintenanace Worker Gary Burke, Volunteer Karl Reidl and 6th grader Tony Laversa took down 14 purple martin boxes on the Refuge (11 wooden boxes, two of which are equipped with 4 gourds each (8 gourds), Lot #1, 2 aluminum houses, Lot #1 & 2, and one newer wooden box with half moon shape entrance holes at Lot # 4. Wooden perches were installed on top of all the poles for the winter. One of the two poles at SeaHaven was not re-erected due to a stripped bolt, this will be repaired and will be equipped with a perch before winter. The crew met at 08:00 and was finished removing boxes by 11:00. Deb, Karl and Tony remained at Sub-HQ to take apart, record and clean out the boxes. This procedure took about 2 hours. The newer box at Lot # 4 was lowered, found to have had no nests and was therefore left on the pole due to the difficulty in removing the boxes from the 6x6 telescoping shaft.

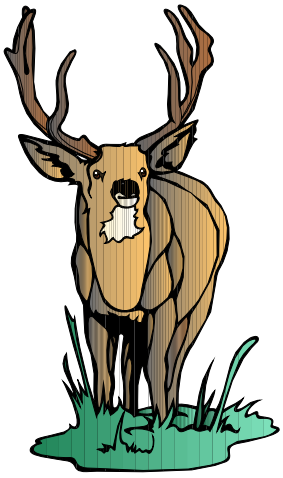
A total of 99 purple martin nests were recorded. All wooden boxes had purple martin nests, no nests were found in the aluminum boxes or in the newer wooden box at Lot # 4. Boxes 2a (Lot #1 south), 4a (Lot # 3 south) and 7 (SeaHaven -east) had the highest number of purple martin nests with 14 nests each. The latter nest box also recorded the highest purple martin mortality (71%) with 10 dead

birds. Suspected cause of mortality is most likely from poor ventilation thus overheating. This box will be repaired to provided better ventilation next year. The gourds had 2 purple martin nests plus two addtional nest attempts along with 2 house sparrow nests. This is the first time the gourds have recorded nests. The gourds were installed in April, 1996.

The two aluminum boxes which were erected late (May) in 1996 have not produced any purple martin nests to date. One house sparrow nest was recorded this year along with three partial purple nest attempts. Next year it may be worthwhile to fill several compartments with purple martin nesting materila in an attempt to attrack birds to these structures.

The kestrel and bluebird/tree swallow nesting boxes were inspected and cleaned out on October 22 by refuge volunteer Wally Dash. Of the original 15 bluebird/tree swallow boxes erected in 1989 only six remain along with a few older boxes that were never removed. Of these, six were used by tree swallows and none by bluebirds.

8. Game Mammals



Aerial Deer Survey:

An aerial deer survey was conducted on March 10, 1997 on the Plum Island portion of Parker River NWR (including Grape Island) and Sandy Point State Reservation. Pilot Dale Hardy from Wiggins Airway was contracted to fly the survey in an OAS approved Bell Helicopter. The survey was performed from approximately 12:40-13:40 hours (military time) with observers; MW Gary Burke and BIO Melvin, ROS Glynnis Nakai served as recorder. Normally the refuge and Cranes Beach conduct aerial surveys during the same time, each paying for their respective survey flight time plus sharing the costs of the ferry time to and from the airport. However, this year Cranes Beach decided to conduct their survey during a snow storm in February. The refuge staff felt there wasn't enough snow cover on the refuge at that time and decided to postpone until better conditions were present (see memo dated 2/18/97). Therefore, the refuge bore the total cost of the helicopter flight time this year. Total flight time equaled 1.9 hours versus 1.3 hours last year.

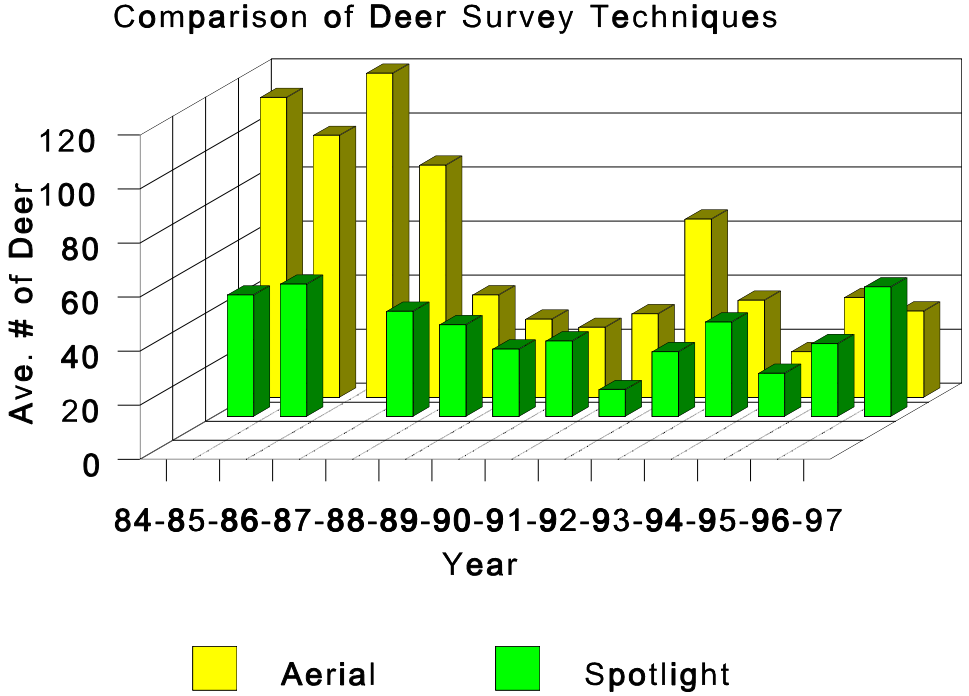
Weather during the survey was excellent with mild conditions. Temperatures were in the mid to high 40's, winds were calm out of the N-NW at 0-3 mph and visibility seemed endless with clear, blue

skies. The tide was extremely high (11' +) which completely covered all areas of the salt marsh. A short but powerful storm that same morning deposited a blanket of snow (average of 4+ inches) over an otherwise barren seacoast landscape. The storm ended around mid morning and was followed by a significant warm front.

A total of 32 deer were observed during the survey, all on Plum Island, no deer were seen on Grape Island or on Sandy Point. As noted above, deer movement was minimal, thus reducing and most likely eliminating any double counting of the same individual(s). Staff felt confident that approximately 90-95% of the area was covered and were confident in their ability to clearly view the majority of the survey area. The only areas difficult to monitor continued to be the scattered pine forests throughout the refuge which obscures visibility to the ground. Other observations were minimal with no sightings of fox, raccoon, or other mammals. MW Burke noted 11 muskrat houses, 1 in the Bill Forward Pool with the rest located in Stage Island. BIO Melvin counted approximately 150 black ducks, 16 swans, 50-60 Canada geese, 23 mergansers, a few small groups of wigeon and pintails and over 200 eiders .

The graph below displays comparisons between spotlight and aerial survey estimates from 1984 to present. This graphic representation illustrates that variation between survey techniques does exist in estimating population projections. However, these techniques are use to monitor population trends not whole populations. As can be seen in the graph, both techniques identify the decline in the population trend in the mid to late 1980's when the refuge implemented a hunting program (1987) to that in the 1990's. Aerial counts generally provide a more comprehensive estimate in the overall population index due the complete survey coverage versus the spotlight count which surveys a proportional area. Spotlight counts are primarily used as a back-up index during periods when it may not be possible to complete aerial counts for one reason or another.

Parker River NWR



The following table documents total and average aerial white-tailed deer counts on Parker River National Wildlife Refuge and tallies the deer harvest from Refuge hunts which took place in 1987-90, 1993, 1995-97.

Winter Season	Months	Flight #1	Flight # 2	Average of flights	Hunt (Y/N)	# Harvested[a]
1983/84	Jan/Jan	58	68	63	N	N/A
1984/85	Jan/Jan	119	103	111	N	N/A

1985/86	Feb/Feb	100	94	97	N	N/A
1986/87	Jan/Jan	110	129	120	N	N/A
1987/88	Jan/Jan	89	82	86	Y	55
1988/89[b]	Jan	38			Y	58
1989/90	Jan	29			Y	11
1990/91	Jan	26			Y	13
1991/92	Dec	31			N	N/A
1992/93	Jan	66			N	N/A
1993/94	Jan	36			Y	46
1994/95	Mar	17[c]			N	N/A
1995/96	Feb	37			Y	22
1996/97	Mar	32			Y	17
1997/98	Feb	54[d]			Y	23

[a] Deer harvest conducted in the fall prior to the aerial survey

[b] Due to budget constraints, only one aerial completed beginning in 1989

[c] Survey conducted under marginal survey conditions (snow cover). Staff felt countwas invalid and did not represent a true population index for that year.

[d] Aerial survey data not included in above text. It will be reported in 1998 Annual Narrative Report

Spotlight Survey:

Ten pre-hunt and two post- hunt spotlight surveys were conducted from September 17 through December 16, 1997. The two-day deer hunt took place on December 1 and 2, 1997 which harvested 23 deer (12 bucks, 11 does) from the Refuge. The surveys were primarily conducted by BIO Melvin, ARM Drauszewski, Maintenance Worker Springfield and volunteers W. Dash, J. Burke, S. Drauszewski and K. Reidl. Surveys were conducted according to the procedures as described in the Wildlife Inventory Plan (Procedure # 1). Local police were notified of survey activities prior to the survey season.

The maximum number of deer observed occurred on November 5 when 58 deer (15 fawns, 32 does, 5 bucks and 6 unknown) were observed. The lowest count during the survey period totaled 28 during two surveys (September 17 and 23). The average number of deer observed during the ten pre-hunt surveys was 40. The buck:doe ratio for the

pre-hunt survey data was 25 bucks to 100 does or 0.25:1. Doe:fawn ratio for the same data set was 1:0.60 which equates to 60 fawns for every 100 does. These ratios are considered low.

Two post-hunt surveys were completed, the first, one week after the hunt and the second on the following week (three weeks post hunt). The first post-hunt survey observed 50 deer (only eight less than the highest pre-hunt count) , and the second survey recorded 48 deer. These counts were higher than anticipated since 23 deer were just removed during the two day hunt and only a high of 58 were observed before the hunt. Other observations included peak counts of 11 skunks (11/5), 8 raccoons (9/17), 5 fox (10/28 & 11/18). These observations all reflect increases from last years' peak counts for these species; (6, 5, and 1 respectively).

The following tables summarizes this falls spotlight survey results.

1997 WHITE-TAILED DEER SPOTLIGHT SURVEY RESULTS

PRE-HUNT SURVEY RESULTS:

DATE	FAWN	DOE	BUCK	UNKNOWN	TOTAL
Sept 17	8	12	8	0	28
Sept 23	7	15	3	3	28
Oct 1	8	13	6	5	32
Oct 14	15	21	5	1	42
Oct 22	15	18	4	3	40
Oct 28	14	12	3	0	29
Nov 5	15	32	5	6	58
Nov 12	22	25	4	1	52
Nov 18	9	25	7	4	45
Nov 25	11	31	7	0	49
Average	12.4	20.4	5.2	2.3	40.3

POST-HUNT SURVEY RESULTS:

Dec 10	15	24	2	9	50
Dec 16	18	27	2	1	48
Average	17	25.5	2	5	49

Based on Pre-Hunt Survey Data:

Buck:Doe ratio = $\frac{5.2}{20.4}$ = .25, equates to 25 bucks/100 does

Fawn:Doe ratio = $\frac{12.4}{20.4}$ = .60, equates to 60 fawns/100 does

Deer Exclosures: No data was collected this year. Vegetative data collection is scheduled for two years intervals ie., 1996, 1998.

9. Marine Mammals

During the winter months, we received numerous reports of seals on the beach from the public. Most of these seals were uninjured and simply resting on the beach. Several seals were relocated from crowded town beaches to the refuge beach to afford less disturbance. Unfortunately, a couple were found dead and washed up on the beach; these were reported to New England Aquarium for their information and collection if interested.

10. Other Resident Wildlife

A Predator Scent Station Survey was conducted on October 21-22, 1997. The survey followed the procedures as described in the Station Wildlife Inventory Plan. The survey is conducted annually in September or October to obtain a population index of the red fox population and other mammalian predators which impact nesting shorebirds and waterfowl.

Nineteen of the twenty stations were operable during the survey. One station was inoperable due to the observers inability to clearly identify individual tracks due to lighting and water drops from canopy trees. Six of the 19 stations were visited by red fox, 6 by skunk, 1 by raccoon and 0 by opossum. **Table 1** summarizes this years results for all species.

Table 1.

	Red Fox	Raccoon	Skunk	Opossum
Total Visits	**6**	**1**	**6**	**0**
Mean Visits/Transect	**3**	**0.5**	**3**	**0**
Index	**316**	**53**	**315**	**N/A**

The index is calculated as follows for each species of interest

$$\frac{\text{Total Number of Visits}}{\text{Total \# Operable Stations}} \times 1000 = \text{INDEX}$$

FOX: The index for fox this year is 316, a 36% increase from last years index of 200. See **Table 2.** However this year's findings represent a 24% decrease from the overall average of 414 (1991 -1997). As can be seen from **Figure 1,** the fox index fluctuates more (low of 200 to a high of 632) from year to year than either raccoon or skunk. This year's slight increase still puts the fox index below the long term average index of 414. However, if trapping efforts continue to be minimal as observed over the past few years, the population will most likely continue to increase. See **Table 3 & Figure 2.** The two foxes that were surprisingly captured in live traps this year were both yearling females. It is very unusual to live trap foxes since they are generally very leery of man-made structures and human scent.

RACCOON: The index for raccoon this year is 53 which represents a 73% decrease from last years index of 200. See **Table 2.** The raccoon index has remained relatively stable, fluctuating only slightly from a low index of 50 to a high of 200 (**Figure 1**). This years index of 53 represents a 49% decrease from the long term average index of 103 See **Table 2.**. No raccoons were captured during the trapping period in 1997. **Table 3** reflects the low number of individual raccoons trapped (average of 0.7) over the seven year trapping history. The decrease from the scent station results coupled with the decrease in trapping success may be an indication of a slight population decline of this species on the Refuge. It should be noted that this hypothesis is only based on the above given information which only relies on one census period (scent stations) and incidental trapping efforts (indirect trapping effort to control predation on nesting shorebirds and during the waterfowl pre-season banding program).

SKUNK: The skunk population index which had basically mirrored that of the raccoon, changed this year by observing an increase rather than the decrease that was observed with raccoons. See **Figure 1.** The index for skunks this year is 316 which represents an increase of 26% from last years index of 250 and reflects the highest index since 1991 (**Table 2).** The skunk population index has continued to increase over the past three years. The last decrease was observed during the 1994 scent station survey. See **Figure 1**. This years index also represents a 44% increase from the long-term average index of 178 (**Table 2**). As can be observed in **Table 3 & Figure 2,** only 2 animals were trapped in 1997 which represents a decrease from 1996 and 1995 when 4 and 5 animals were trapped respectively. This years trapping results are also well below the long-term average of 4.1 animals/year (1991-1997).

Interpretation of this data would suggest that predator control efforts should continue and increase to effectively control the increase in the population trend of red fox and skunks. Red fox and skunk population monitoring and future control should be aggressively pursued since their impact on the nesting success of plovers and terns in addition to waterfowl is of paramount concern.

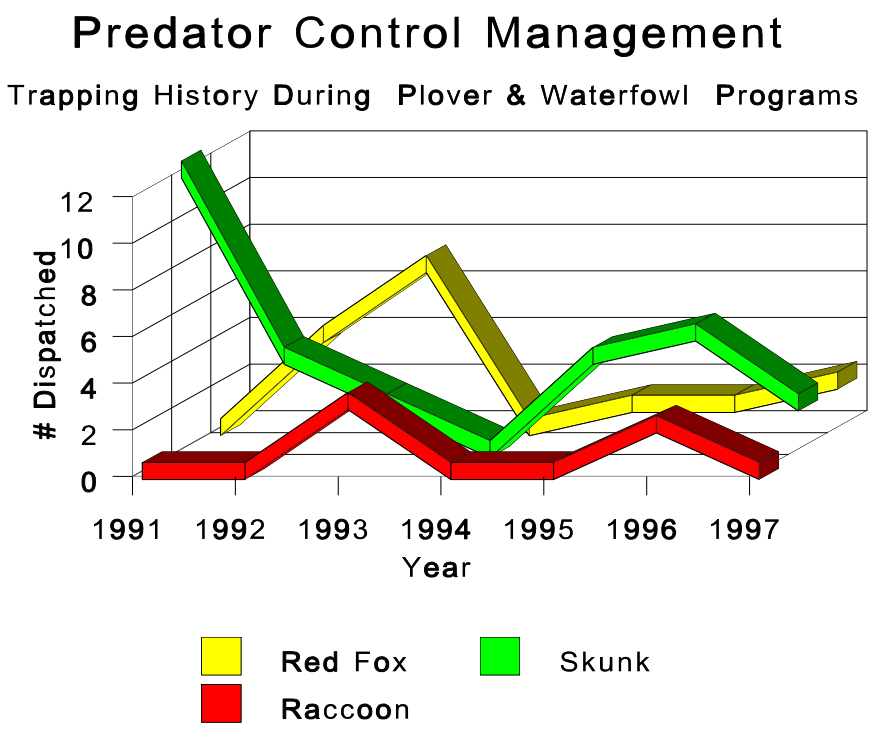
TABLE 2. Predator Scent Station Population Index.

Species	1991	1992	1993	1994	1995	1996	1997	Average
Red Fox	500	500	278	474	632	200	316	414
Raccoon	100	50	111	50	158	200	53	103
Skunk	150	0	222	100	211	250	316	178

TABLE 3. Predator Trapping History.

Species	1991	1992	1993	1994	1995	1996	1997	Average
Red Fox	0	4	7	0	1	1	2	2.1
Raccoon	0	0	3	0	0	2	0	0.7
Skunk	12	4	2	0	4	5	2	4.1

Figure 1.


Predator Control Management
Trapping History During Plover & Waterfowl Programs
Dispatched
12
10
8
6
4
2
0
1991
1992
1993
1994
1995
1996
1997
Year
Red Fox
Skunk
Raccoon

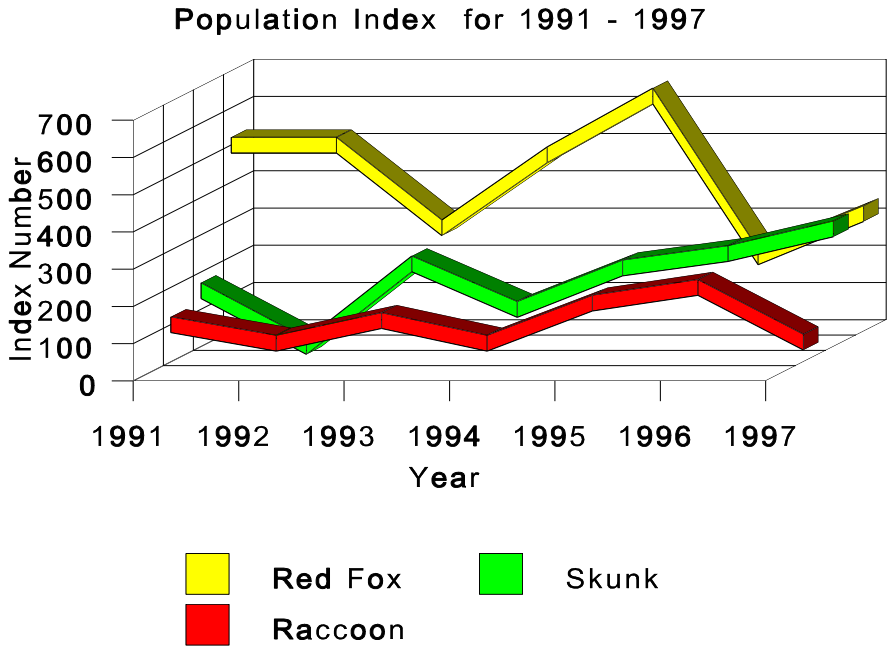

Predator Scent Station History
Population Index for 1991 - 1997
Index Number
700
600
500
400
300
200
100
0
1991
1992
1993
1994
1995
1996
1997
Year
Red Fox
Skunk
Raccoon

Figure 2.

13. Surplus Animal Disposal

In December, Biologist Melvin inventoried the refuge freezer to report salvaged migratory birds and other animals found or collected on the Refuge as a requirement of federal and state salvage permits. The following species were reported on the 1997 MDFW Annual Report/Renewal Form for Scientific Collecting, Salvage & Bird Banding:

Month	Species	Number
Jun	Yellow Warbler (_)	1
Jul	Long-tailed Weasel	1
Nov	Dark-eyed Junco	1

14. Scientific Collections

Nothing to Report

15. Animal Control

In compliance with the Refuges permit to control exotic species from the Massachusetts Division of Fisheries and Wildlife, the refuge removed 10 mute swans and one whooper swan. Sixteen mute swans were present during the breeding season with several pairs attempting to nest. One nest was located in April with 6 eggs which were adled. In addition,four young whooper swans became regular visitors during the spring. The refuge, working in cooperation with the State attempted to trap the swans without success. It was agreed upon by state and federal officials that these whooper swans originated from an the escape of a captive pair in Essex County. The refuge successfully removed one cygnet from the refuge.

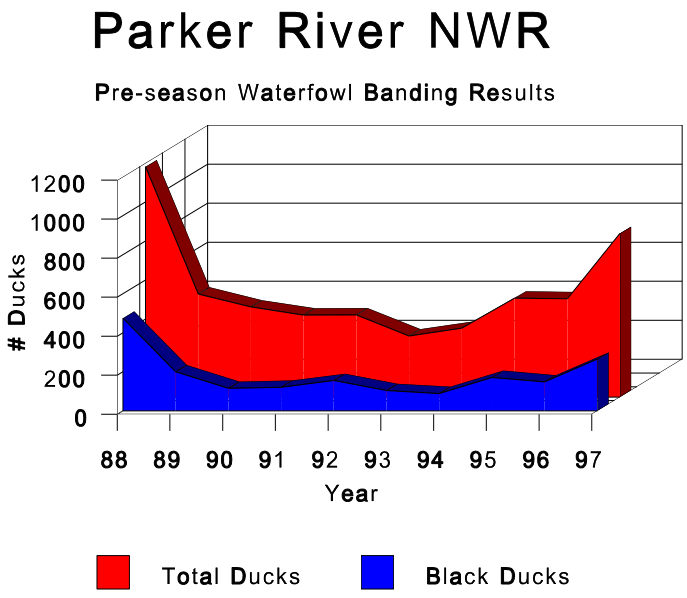
Predator control efforts for the protection and enhancement of migratory waterfowl and nesting shorebirds (specifically piping plovers and least terns) was conducted by refuge staff. Due to the ban on the use of laeg-hold traps, refuge staff were limited in their efforts to effectively control fox. However, two young kit foxes were successfully captured using Hav-a-hart traps and were

euthanized. In addition, two striped skunks and two opposums were trapped within the piping plover nesting territory and were dispatched.

16. Marking and Banding

Banding activities began on August 20 and ended on October 3. Two walk-in (Montezuma) and four swim-in (Benning II) traps were used at three main wetland areas (North Pool, Bill Forward & Stage Island Pools) for a total of 164 trap nights. A total of 839 ducks were banded including 387 mallards, 265 black ducks, 119 green-winged teal, 58 blue-winged teal, 5 mallard/black duck hybrids, 4 northern pintails and 1 gadwall. Trap mortality totaled 17 ducks (2%) of which 9 were green-winged teal (drowning), 6 were mallards (fox,& raccoon predation) and 2 were black ducks (fox and raccoon predation). Due to the higher incidence of mammalian predation at the two walk-in traps these traps were shut down and trapping discontinued after September 17. The walk-in traps also had a lower capture success (9%) or 74 ducks.

As in previous years, mallards were the most common duck banded as they made up 46% or 387 of the total banded birds. The second most common duck banded was black ducks with 32% (265) of all banded birds. This is first time in since 1989 that the Refuge has met its black duck quota of 200! See the **chart below** for pre-season waterfowl banding results during the past ten years.



17. Disease Prevention and Control

Nothing to Report

H. PUBLIC USE

8. Hunting

A controlled harvest of white-tailed deer was conducted at Parker River NWR, Newburyport, MA on December 1 and 2, 1997, as part of the White-tailed Deer Research/Management Program to maintain a healthy deer herd and habitat. A total of 88 hunters participated in the two-day harvest and contributed approximately 645 hours.

Twenty three deer representing 12 males and 11 females, were harvested from the Refuge. No deer were taken from Sandy Point State Reservation this year. The age structure of deer harvested from the Refuge comprised of 11 fawns (48%), five yearlings (22%), and seven adults (30%) at or over 2.5 years. Of the seven adult deer, three were aged at 2.5, two at 3.5 and two at or above 4.5 years. A majority of the males harvested were fawns and yearlings with equal number of each (5 and 5) for a total of ten male deer under two years or 83% of the total. Only two adult males were harvested which represents only 17% of the male harvest. A slightly different age structure was observed in the females with a total of 6 fawns and no yearlings representing 55% of the total female harvest under two years. Three adult females (27%) were aged at 2.5+ years and one each at 3.5 and 4.5+(18%). Males ranged in weight from 55-165 lbs (average 97.8 lbs.) and females ranged from 52-109 lbs. (average 77.6 lbs.). As is natural, antler beam diameter increased with age and individual's dressed weight and ranged from 13-32 mm (average 20 mm). Kidney fat indices (KFI's) were calculated for each age group and gender and ranged from a low KFI of 182.4 (1.5 year old males) to a high of 220.5 (2.5 year old female). Upon visual observation only, kidney fat appeared abundant, suggesting healthy individuals. KFI is used to monitor trends and will therefore be used to make comparisons between years and for long term analysis.